

Adding depth to drug discovery

Tecan and TAP Biosystems have created an automated 3D cell culture screening platform by automating TAP's RAFT™ cell culture technology on the Freedom EVO® workstation. This system uses *in vivo*-like concentrations of collagen matrix to ensure cell growth and proliferation in an environment closely resembling native tissue, with the added reliability and throughput of automated liquid handling.

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TAP Biosystems, a leading supplier of innovative cell culture systems, has been serving the drug discovery market for over 20 years, offering automated cell culturing capabilities to the pharmaceutical sector for screening and bioprocess development. TAP's latest innovation, the collagen-based RAFT cell culture system, allows scientists to quickly and conveniently create 3D cell cultures in a 96-well, ANSI/SLAS-compatible format. Dr Grant Cameron, TAP Biosystems' RAFT Development Director, explained: “The drug discovery sector, both in academia and industry, has expressed increasing interest in 3D cell culture systems for secondary screening applications. This is driven by the need to grow cells in a more ‘realistic’ environment, allowing more accurate replication of *in vivo* cellular behavior.”

Use of this type of technology for screening applications requires the development of straightforward and highly reliable techniques for the creation of 3D cell cultures. The RAFT technology has been designed to allow scientists to quickly and reproducibly create a cell culture that not only allows 3D cell growth, but also provides a biologically-relevant matrix of type-I collagen. By creating these cultures in a 96-well, microplate-based format, this technology provides researchers with a convenient and practical way of performing 3D cell culture screens in virtually any laboratory.

Increasing speed and throughput are ongoing goals of drug discovery scientists, making automation of the RAFT protocol a logical step to help streamline culture generation without compromising on quality. Grant continued: “TAP Biosystems has had a long relationship with Tecan across a number of

projects, and we saw no point in reinventing something that Tecan was already doing very well. A collaboration was the logical solution, especially as Tecan is taking a leading role in the development of automated 3D cell culture applications.”

Automation of RAFT was a key consideration for TAP Biosystems throughout the development process, including the use of ANSI/SLAS-compatible plate formats. The initial throughput of the automated system was not a major factor, as the 3D cell culture market is not currently focused on high throughput applications. However, the consistency of the process was imperative. Grant said: “Tecan's applications specialists were very supportive, helping us to understand the various technological options, and we were very open to suggestions for the best ways to automate the various steps of the protocol. They took the time to fully understand the RAFT process before performing the initial application development work in Männedorf, then worked very closely with us here in the UK to optimize the automated protocol.”

Dr Cécile Villemant, a development scientist at TAP Biosystems, explained the automated protocol: “The RAFT kit contains all the reagents and specialized labware for the preparation of 96-well plates of collagen-based 3D cell cultures. Reagents are loaded into temperature-controlled reagent troughs on the deck of the Freedom EVO, along with a cell stock solution. The workstation generates the collagen mixture by combining the reagents in a trough, then thoroughly mixing by gentle aspiration and dispensing. Cell addition and mixing then occurs, followed by precise dispensing into the



Grant Cameron and Cécile Villemant with TAP Biosystems' Freedom EVO workstation

96-well culture plate, and the plates are heated to 37 °C using a Te-Shake™ module to allow the gelling process to occur. After a 15 minute incubation, cells are encapsulated within the collagen gel and the system's Robotic Manipulator Arm places the RAFT absorber plate onto the culture plate, concentrating the culture to produce an *in vivo*-like environment. After the RAFT absorber plate is removed, the workstation's Liquid Handling Arm adds 100 µl of fresh medium to create an assay-ready plate. This

set-up is very reliable, and frees up staff time to perform more valuable work."

Grant concluded: "It has been a truly joint approach, working closely together to provide the best solution for our customers, and we have had many insightful discussions with the Tecan team. Our work with Tecan has also extended into the data acquisition and analysis arena, and we are now using an Infinite® M200 PRO multimode reader to help explore the broad analytical capabilities

of our RAFT technology with various assay systems. Overall it has been an excellent collaboration, and we are looking forward to further expanding both our technical and commercial partnership."

To find out more about Tecan's 3D cell culture solutions, visit www.tecan.com/3dcellculture

To find out more about the RAFT cell culture system, visit www.raft3dcellculture.com

